

APPENDIX H – WASTE GENERATION

H.1 INTRODUCTION

This appendix contains information supporting the waste generation impacts analysis. It details Sandia National Laboratories/New Mexico's (SNL/NM's) current and anticipated future waste generation and disposal activities under the three alternatives proposed in this Site-Wide Environmental Impact Statement (SWEIS): No Action, Expanded Operations, and Reduced Operations. The information used in this analysis was taken from available baseline data, projected operational levels, projected material consumption, and actual waste generation quantities given in the following documents:

- SNL/NM facility source documents (SNL/NM 1998a);
- *SNL/NM Environmental Information Document* (SNL/NM 1997a);
- *Facilities and Safety Information Document* (SNL/NM 1997b, SNL/NM 1998ee);
- *Environmental Assessment of the Environmental Restoration Project at Sandia National Laboratories/New Mexico*, DOE/EA-1140 (DOE 1996c);
- *Medical Isotopes Production Project: Molybdenum-99 and Related Isotopes Environmental Impact Statement*, DOE/EIS-0249F (DOE 1996b); and
- *Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE 1997i).

For detailed discussions of these waste types and waste management impacts, see Sections 4.11, 5.3.10, 5.4.10, and 5.5.10. Additional information on transportation associated with waste activities is presented in Sections 4.10, 5.3.9, 5.4.9, 5.5.9, and Appendix G.

H.2 SCOPE OF THE ANALYSIS

Multipliers were calculated to analyze waste generation impacts and to project the quantities of waste expected to be generated under each alternative in this SWEIS. These multipliers were derived from base year (typically 1996 or 1997) material inventories (see Appendix A, Material Inventory, for details on multiplier calculations) and from projections presented in the SNL/NM facility source documents (SNL/NM 1998a) for the 10-year time frame of this SWEIS (1998 to 2008).

This analysis focuses on waste types, volumes, onsite storage capacities, and offsite disposal. To further refine projections

for the three alternatives, waste generation was further identified by the following four sources:

- Selected facilities (10 selected facilities under the SWEIS as having the most potential for impact)—existing operations (see Chapter 3 for a discussion on the selection of facilities). The waste projections for selected facilities are the maximum quantities generated for any 1-year period. Existing operations-derived wastes are considered to be those generated from mission-related work (see Chapter 2 for definitions of mission lines).
- Selected facilities—new operations. New facilities or new operations were addressed separately from existing operations to show the changes from the base year, without large increases from the new programs inflating the results.
- Balance of operations—existing operations. This source includes wastes generated during the base year from the balance of SNL/NM operations not covered under selected facilities or special projects.
- Special Projects. Due to the nature of SNL/NM operations, irregular or one-time waste generation activities from special projects that are not existing operations-related are possible. These projects include the Environmental Restoration (ER) Project, Decontamination and Decommissioning (D&D) Program, and Legacy Waste Work-off Project.

Special wastes were treated as a separate category in this analysis, even though special wastes could include all waste categories identified below, because of the potentially large volumes of these wastes, their special treatment and storage, and the specific time frames of their generation, storage, and disposal (Section H.3.3).

H.3 WASTE CATEGORIES

The various waste categories that would potentially be generated by SNL/NM include

- radioactive, including low-level wastes (LLW), low-level mixed wastes (LLMW), transuranic (TRU) wastes, and mixed transuranic (MTRU) wastes (Section H.3.1);
- hazardous, including chemical wastes (*Resource Conservation and Recovery Act* [RCRA]-listed, *Toxic Substances Control Act* [TSCA]-listed), and biohazardous (medical) wastes (Section H.3.2);

- nonhazardous, including solid wastes deposited in local landfills (trash and debris) and sewage (process wastewater) (Section H.3.3); and
- recyclable material, including such things as lead, ignitable liquids, solvents, oils, scrap metal, paper, and plastics (Section H.3.4).

Each of these waste categories was evaluated for waste generation impacts, including the amount of each waste category generated for the base year and for each of the alternatives. For spent fuel inventory projections, see Appendix A.

H.3.1 Assumptions

Several assumptions were made that had impacts across the various waste streams. The most important assumption was waste density, which was also the basis for other calculations. Waste density was calculated using the following equation:

$$\frac{\text{weight of waste}}{\text{volume of waste}} = \text{density of waste for a specific volume}$$

(Eq. H.3-1)

For water, the density is approximately equal to 1.0 kg/L and 1 L=0.001 m³. Therefore:

$$\frac{1,000 \text{ L}}{1 \text{ m}^3} \times \frac{1.0 \text{ kg}}{1 \text{ L}} = 1,000 \text{ kg/m}^3$$

(Eq. H.3-2)

One 55-gal drum of waste has approximately 7.35 ft³ of volume. For normal operations, the drum is left with some void space at the top, usually 5 percent, leaving a full drum of waste with 7 ft³ of usable volume. There are 35.3 ft³ in every cubic meter. Therefore:

$$\frac{7 \text{ ft}^3}{1 \text{ drum}} \times \frac{1 \text{ m}^3}{35.3 \text{ ft}^3} = 0.2 \text{ m}^3/\text{drum}$$

(Eq. H.3-3)

Densities of waste generated from the representative selected facilities are shown in Table H.3-1. Waste projections were based on these numbers when actual densities were unavailable, so that the information could be presented in standard units.

Table H.3-1. Densities Used to Calculate Waste Quantities^a

WASTE	DENSITY ^b (kg/m ³)
<i>Low-Level Waste</i>	500
<i>Low-Level Mixed Waste</i>	550
<i>Transuranic</i>	310
<i>Mixed Transuranic</i>	76
<i>Hazardous</i>	1,000
<i>Solid</i>	310

Sources: SNL/NM 1998a, t

kg/m³: kilograms per cubic meter

^a Densities are listed; however, actual quantities are used whenever possible.

^b Rounded to two significant digits

H.3.2 Radioactive Wastes

Table H.3-2 lists radioactive waste volumes, by radioactive waste type, selected facilities (existing operations), new facilities (new operations), and balance of operations (existing operations) for the base year and each of the three alternatives.

H.3.2.1 Low-Level Waste

It is expected that the disposal of LLW will continue at DOE-approved facilities. Pending the final decision for the *Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE 1997i), facilities including, but not limited to, the Nevada Test Site (NTS) or a commercial facility such as the Envirocare facility located outside of Clive, Utah, will be used. Disposal at these facilities is dependent on the waste meeting their waste acceptance criteria. Projected waste volumes are shown in Table H.3-2. Current waste storage levels and waste capacities are shown in Table H.3-3. Table H.3-4 shows medical isotopes production waste volumes.

H.3.2.2 Low-Level Mixed Waste

It is expected that the treatment and/or disposal of LLMW would occur at DOE-approved facilities pending the final decision for the *Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Wastes* (DOE 1997i). Examples of these facilities include: the CIF Incinerator at the Savannah River Site, South Carolina; the WERF Incinerator at INEEL, Idaho; the TSCA Incinerator at Oak Ridge,

Table H.3–2. Radioactive Waste Generation by Alternative

FACILITY	BASE YEAR ^a	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
LLW, SELECTED FACILITIES, NORMAL OPERATIONS (ft ³)					
Microelectronics Development Laboratory	4	5	7	8	3
Explosive Components Facility	95	190	190	190	190
Neutron Generator Facility	211	282	282	282	282
Radioactive and Mixed Waste Management Facility ^b	119	154	154	196	59
Sandia Accelerator & Beam Research Experiment	4	4.8	4.8	8.4	0
High-Energy Radiation Megavolt Electron Source III	0.25	0.48	0.48	1.38	0.04
Z-Machine	44	20	20	28	12
Gamma Irradiation Facility	56	0	0	126	56
Sandia Pulsed Reactor	31	31	31	63.4	31
Radiographic Integrated Test Stand	2.1	4.2	6.3	8.5	1.1
Subtotal	566	692	696	911	634
LLW, NEW FACILITIES (OPERATIONS)					
Hot Cell Facility	100	2,200	2,200	5,000	270
Annular Core Research Reactor (medical isotopes production configuration)	56	370	370	1,090	56
Annular Core Research Reactor (DP configuration)	0	0	35	170	0
New Gamma Irradiation Facility	0	92	92	126	56
Subtotal	156	2,662	2,697	6,386	382
LLW, BALANCE OF OPERATIONS, NORMAL OPERATIONS (ft ³)					
Balance of Operations	2,600	2,600	2,600	2,600	2,600
TOTAL LLW	3,322	5,954	5,993	9,897	3,616
LLMW, SELECTED FACILITIES, NORMAL OPERATIONS (kg)					
Neutron Generator Facility	150	300	300	300	300
Radioactive and Mixed Waste Management Facility ^b	842	1,095	1,095	1,390	421
Sandia Pulsed Reactor	143	143	143	500	143
Aerial Cable Facility	0	0	0	0	0

Table H.3–2. Radioactive Waste Generation by Alternative (continued)

FACILITY	BASE YEAR ^a	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
<i>Sled Track Facility</i>	0	0	0	0	0
<i>Lurance Canyon Burn Site</i>	0	0	0	0	0
<i>Explosive Components Facility</i>	1,000	1,000	1,000	1,000	1,000
Subtotal	2,135	2,538	2,538	3,190	1,864
LLMW, NEW FACILITIES (OPERATIONS) (kg)					
<i>Hot Cell Facility</i>	250	607	607	1,429	179
<i>Annular Core Research Reactor (DP configuration)</i>	0	0	0	179	0
Subtotal	250	607	607	1,607	179
LLMW, BALANCE OF OPERATIONS, NORMAL OPERATIONS (kg)					
<i>Balance of Operations</i>	157	157	157	157	157
TOTAL LLMW	2,542	3,302	3,302	4,954	2,200
TRU WASTE, SELECTED FACILITIES, NORMAL OPERATIONS (ft³)					
<i>Z-Machine</i>	0	8	8	16	0
<i>Sandia Pulsed Reactor</i>	0	2	2	5	0
Subtotal	0	10	10	21	0
TRU WASTE, NEW FACILITIES (OPERATIONS) (ft³)					
<i>Annular Core Research Reactor (DP configuration)</i>	0	0	0	5	0
Subtotal	0	0	0	5	0
TRU WASTE, BALANCE OF OPERATIONS, NORMAL OPERATIONS (ft³)					
<i>Balance of Operations</i>	0	0	0	0	0
TOTAL TRU	0	10	10	26	0
MTRU WASTE, SELECTED FACILITIES, NORMAL OPERATIONS (ft³)					
<i>Sandia Pulsed Reactor</i>	0	2	2	5	0
<i>Radioactive and Mixed Waste Management Facility^b</i>	0	2	2	5	0
Subtotal	16	23	23	32	8
MTRU WASTE, NEW FACILITIES (OPERATIONS) (ft³)					
<i>Annular Core Research Reactor (DP configuration)</i>	0	0	0	5	0

Table H.3–2. Radioactive Waste Generation by Alternative (concluded)

FACILITY	BASE YEAR ^a	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
Subtotal	0	0	0	5	0
Balance of Operations	0	0	0	0	0
TOTAL MTRU	1	23	23	37	8

Sources: SNL/NM 1998a, 1997b

DP: Defense Programs

ft³: cubic feet

kg: kilograms

m³: cubic meter

LLMW: low-level mixed waste

LLW: low-level waste

MTRU: mixed transuranic

RMWMF: Radioactive and Mixed Waste Management Facility

TRU: transuranic

^a The base year varies depending on information provided in the *Facilities and Safety Information Document* (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.^c RMWMF MTRU waste should be considered to be inventory based on projected facility operations.

Note: 1) Numbers are rounded and may differ from calculated values.

2) LLW and LLMW managed by the RMWMF may require repackaging and generation of a secondary waste. Waste generated for these operations was assumed to be less than 1 percent of the total in storage and was considered the bounding case.

Table H.3–3. Low-Level Waste in Storage and Facility Storage Capacity^a

FACILITY	LLW IN STORAGE		FACILITY CAPACITY	
	WEIGHT (kg)	VOLUME (m ³)	WEIGHT ^b (M kg)	VOLUME (m ³)
High Bay (6596) in TA-I	0	0	2.268	1,800
ISS in TA-III	0	0	0.643	510
Manzano Bunker 37118^c	0	0	0.352	279
Manzano Bunker 37045^c	0	0	0.222	176
Manzano Bunker 37078^c	0	0	0.352	279
Manzano Bunker 37063^c	255	0.62	0.296	235
Manzano Bunker 37034^c	4,450	6.71	0.296	235
Manzano Bunker 37055^c	1,732	3.48	0.222	176
Manzano Bunker 37057^c	6.4	0.82	0.222	176
RMWMF in TA-III	69,811	325	10.08	8,000
TOTAL LLW IN STORAGE	76,255	336		
TOTAL FACILITY CAPACITY			14.95	11,874

Source: SNL/NM 1998a

ACRR: Annular Core Research Reactor

ISS: Interim Storage Site

kg: kilograms

LLW: low-level waste

m³: cubic meters

M kg: million kilograms

RMWMF: Radioactive and Mixed Waste Management Facility

TA: technical area

^a LLW generated from the ACRR, while operating in the medical isotopes production configuration, will be managed at the ACRR facility prior to offsite disposal.^b Facility weight capacity is based on a maximum weight of 250 kg per drum (actual), using all available storage.^c See Figure 4.4–12 for the approximate locations of these waste storage facilities.

Note: Numbers are rounded and may differ from calculated values.

**Table H.3–4. Medical Isotopes Production Project,
Low-Level Waste Projections (kg)**

FACILITY	BASE YEAR ^a	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
<i>Hot Cell Facility</i>	1,686	37,086	37,086	84,286	4,551
<i>ACRR (medical isotopes production configuration)</i>	944	6,237	6,237	18,374	944
TOTAL	2,630	43,323	43,323	102,660	5,495

Sources: SNL/NM 1998a, SNL/NM 1997b

ACRR: Annular Core Research Reactor

kg: kilograms

LLW: low-level waste

^a The base year varies depending on information provided in the *Facilities and Safety Information Document* (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.

Note: Waste generated by the Medical Isotopes Production Project (MIPP) represents approximately 32 to 84 percent of the selected facility total LLW at SNL/NM projected under the three alternatives.

Tennessee; Environcare facilities in Clive, Utah; Waste Control Specialist in Texas; DSSI, Oak Ridge, Tennessee, for treatment; Hanford, Washington, for disposal; and the NTS, Nevada, for disposal. Disposal at these facilities is dependent on meeting waste acceptance criteria. Projected waste volumes are shown in Table H.3–2. Current stored quantities of these wastes and capacities of storage facilities are shown in Table H.3–5. Table H.3–6 lists medical isotopes production waste volumes.

H.3.2.3 Transuranic and Mixed Transuranic Waste

The existing TRU and MTRU wastes stored onsite, as well as all future TRU and MTRU wastes, are to be transferred to Los Alamos National Laboratory (LANL) for certification, as indicated in the January 20, 1998, Record of Decision (ROD) for the U.S. Department of Energy's (DOE's) *Waste Management Program: Treatment and Storage of Transuranic Waste* (DOE 1998n). Projected waste volumes are shown in Table H.3–2. Current stored quantities of these wastes and facility storage capacities are shown in Table H.3–7. Neither TRU nor MTRU wastes would be generated at the ACRR during medical isotopes production.

H.3.3 Hazardous Waste

Table H.3–8 lists hazardous waste volumes by selected facilities (existing operations), new facilities (new operations), and balance of operations (existing operations) for the base year and each of the three alternatives.

SNL/NM uses multiple hazardous waste disposal facilities located throughout the U.S. Table H.3–9 shows these facilities. Wastes shipped in 1997 are shown in Table H.3–10. Hazardous waste storage facility capacities are shown in Table H.3–11. The August 5, 1998, *Record of Decision for the Department of Energy's Waste Management Program: Treatment of Non-Wastewater Hazardous Waste* discusses the decision to continue to use commercially available facilities for hazardous waste disposal (DOE 1998m).

H.3.3.1 Biohazardous (Medical) Waste

The total volume of medical waste would remain generally a function of the total number of full-time employees and subcontractors located at SNL/NM. A total of 2,463 kg of biohazardous waste was disposed of in 1997. No large increase is anticipated based on the information provided.

Table H.3–5. Low-Level Mixed Waste Currently in Storage and Facility Storage Capacity^a

FACILITY	LLMW IN STORAGE		FACILITY CAPACITY	
	WEIGHT (kg)	VOLUME (m ³)	WEIGHT ^b (M kg)	VOLUME (m ³)
<i>High Bay (6596) in TA-I</i>	60,261	101	2.269	1,800
<i>ISS in TA-III</i>	0	0	0.643	510
<i>Manzano Bunker 37118^c</i>	0	0	0.352	279
<i>Manzano Bunker 37045^c</i>	0	0	0.222	176
<i>Manzano Bunker 37078^c</i>	0	0	0.352	279
<i>Manzano Bunker 37063^c</i>	0	0	0.296	235
<i>Manzano Bunker 37034^c</i>	6,568	9.8	0.296	235
<i>Manzano Bunker 37055^c</i>	163.3	1.7	0.222	176
<i>Manzano Bunker 37057^c</i>	0	0	0.222	176
<i>RMWMF in TA-III</i>	17,065	39	10.08	8,000
TOTAL LLMW IN STORAGE	84,057	152		
TOTAL FACILITY CAPACITY			14.95	11,874

Source: SNL/NM 1998a

ACRR: Annular Core Research Reactor

ISS: Interim Storage Site

kg: kilograms

LLMW: low-level mixed waste

m³: cubic meters

M kg: million kilograms

RMWMF: Radioactive and Mixed Waste Management Facility

TA: technical area

^a LLMW generated from the ACRR, while operating in the medical isotopes production configuration, will be managed at the ACRR facility prior to offsite disposal.^b Facility weight capacity is based on a maximum weight of 250 kg per drum (actual), using all available storage.^c See Figure 4.4–12 for the approximate locations of these waste storage facilities.

Note: Numbers are rounded and may differ from calculated values.

Table H.3–6. Medical Isotopes Production Project, Low-Level Mixed Waste Projections (kg)

FACILITY	BASE YEAR ^a	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
<i>Hot Cell Facility</i>	250	607	607	1,429	179
<i>ACRR (medical isotopes production configuration)</i>	0	0	0	179	0
TOTAL	250	607	607	1,607	179

Sources: SNL/NM 1998a, SNL/NM 1997b

ACRR: Annular Core Research Reactor

kg: kilograms

^a The base year varies depending on information provided in the *Facilities and Safety Information Document* (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.

Notes: 1) Waste generated by the Medical Isotopes Production Project (MIPP) represents approximately 32 to 84 percent of the selected facility total LLMW at SNL/NM projected under the three alternatives

2) Numbers are rounded and may differ from calculated values.

Table H.3–7. Transuranic and Mixed Transuranic Waste in Storage and Facility Storage Capacity^a

FACILITY	TRU WASTE		MTRU WASTE		CAPACITY	
	WEIGHT (kg)	VOLUME (m ³)	WEIGHT (kg)	VOLUME (m ³)	WEIGHT ^b (M kg)	VOLUME (m ³)
<i>High Bay (6596)</i>	0	0	0.5	0.03	2.268	1,800
<i>ISS</i>	0	0	0	0	0.643	510
<i>Manzano Bunker 37118 ^c</i>	0	0	0	0	0.352	279
<i>Manzano Bunker 37045 ^c</i>	0	0	0	0	0.222	176
<i>Manzano Bunker 37078 ^c</i>	0	0	0	0	0.352	279
<i>Manzano Bunker 37063 ^c</i>	1,719	4.84	0	0	0.296	235
<i>Manzano Bunker 37034 ^c</i>	0	0	0	0	0.296	235
<i>Manzano Bunker 37055 ^c</i>	0	0	0	0	0.222	176
<i>Manzano Bunker 37057 ^c</i>	0	0	0	0	0.222	176
<i>RMWMF</i>	134	1.22	34	0.42	10.08	8,000
TOTAL TRU and MTRU IN STORAGE	1,853	6.1	34.5	0.45		
TOTAL FACILITY CAPACITY					14.95	11,874

Source: SNL/NM 1998a

ACRR: Annular Core Research Reactor

ISS: Interim Storage Site

kg: kilograms

m³: cubic meters

MTRU: mixed transuranic

RMWMF: Radioactive and Mixed Waste Management Facility

TA: technical area

TRU: transuranic

^a TRU and MTRU waste generated from the ACRR, while operating in the medical isotopes production configuration, will be managed at the ACRR facility prior to offsite disposal.^b Facility weight capacity is based on a maximum weight of 250 kg per drum (actual), using all available storage.^c See Figure 4.4–12 for the approximate locations of these waste storage facilities.

Note: Numbers are rounded and may differ from calculated values.

Table H.3–8. Hazardous Waste Generation by Alternative

FACILITY NAME	BASE YEAR ^a	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
HAZARDOUS WASTE, NORMAL OPERATIONS (kg)					
Microelectronics Development Laboratory	2,520	3,150	4,410	4,738	1,688
Advanced Manufacturing Processes Laboratory	4,732	5,915	5,915	6,625	4,732
Explosive Components Facility	360	500	500	500	500
Integrated Materials Research Laboratory	2,400	2,100	1,850	2,000	2,000
Neutron Generator Facility	2,760	3,680	3,680	3,680	3,680
Hazardous Waste Management Facility	800	750	770	860	690
Thermal Treatment Facility	0	76	76	272	0
High-Energy Radiation Megavolt Electron Source	167	316	316	915	25
SATURN	167	501	501	1,286	100
Short-Pulse High Intensity Nanosecond X-Radiator	21	45	45	107	3.6
Sandia Accelerator and Beam Research Experiment	63	76	76	132	0
Z-Machine	750	1,000	1,000	1,250	400
Advanced Pulsed Power Research Module	50	100	100	200	5
Gamma Irradiation Facility	199	0	0	398	199
Repetitive High Energy Pulsed Power Unit I	0	1	1	1	0
Repetitive High Energy Pulsed Power Unit I	0	5	5	10	0
Sandia Pulsed Reactor	199	398	398	852	199
Radiographic Integrated Test Stand	68	136	204	272	34
Containment Technology Test Facility-West	0.1	0.1	0	0.1	0.1
Sled Track Complex	15	15	15	50	3
Centrifuge Complex	10	12	12	15	12
Aerial Cable Facility	5	5	5	9	5

Table H.3–8. Hazardous Waste Generation by Alternative (concluded)

FACILITY NAME	BASE YEAR ^a	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
<i>Lurance Canyon Burn Site</i>	900	900	900	900	900
<i>Drop/Impact Complex</i>	0	0	0	0	0
<i>Explosives Application Laboratory</i>	1.0	1	1	2	0.5
<i>Terminal Ballistics Complex</i>	0.3	0.5	0.5	0.8	0
Subtotal	16,187	19,682	20,780	25,074	15,176
HAZARDOUS WASTE, NEW FACILITIES (OPERATIONS) (kg)					
<i>Hot Cell Facility</i>	199	398	398	625	199
<i>Annular Core Research Reactor (Medical Isotopes Production Configuration)</i>	199	398	398	852	199
<i>Annular Core Research Reactor (DP Configuration)</i>	0	0	57	398	0
<i>Tera-Electron Volt Energy Superconducting Linear Accelerator</i>	0	50	50	65	2
<i>New Gamma Irradiation Facility</i>	0	398	398	398	199
Subtotal	398	1,243	1,300	2,337	598
Selected Facilities Total	16,585	20,925	22,080	27,411	15,774
Hazardous Waste Derived Multiplier	1.00	1.26	1.33	1.65	0.95
HAZARDOUS WASTE, BALANCE OF OPERATIONS, EXISTING OPERATIONS (kg)					
Balance of Operations	39,267	49,544	52,278	64,902	37,349
TOTAL HAZARDOUS WASTE	55,852	70,469	74,358	92,314	53,132

Sources: SNL/NM 1998a, SNL/NM 1997b

DP: Defense Programs

kg: kilograms

^a The base year varies depending on information provided in the *Facilities and Safety Information Document* (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.

Note: Numbers are rounded and may differ from calculated values.

Table H.3–9. 1997 Waste Disposal and Recyclable Quantities and Sites Used^a

FACILITY NAME	WASTE/MATERIAL TYPE ^b	RCRA WASTE (kg)	NON-RCRA WASTE (kg)
<i>Ensco Environmental Services</i>	Hazardous	34,709	22,907
<i>Keers Environmental</i>	Asbestos	0	148,793
<i>Kinsbursky Bros.</i>	Batteries (recycle)	0	7,715
<i>Kirtland Air Force Base</i>	Explosives	125	0
<i>Laidlaw, NY</i>	Pyrophoric materials, nonflammable gas	218	99
<i>Laidlaw - APTUS, UT</i>	Hazardous, biohazardous (medical), PCBs	10,791	10,455
<i>Laidlaw, UT</i>	PCBs	0	198
<i>Laidlaw, UT</i>	Chromium-contaminated water, contaminated soil, PCBs, asbestos	346,393	32,445
<i>Laidlaw, OK</i>	Hazardous	1,167	0
<i>NSSI</i>	Cylinder	500	0
<i>Safety-Kleen</i>	Used oil (recycle)	0	36,243
<i>Salesco Systems</i>	PCBs, fluorescent lights, nonregulated	419	18,871
<i>SNL/NM</i>	Explosives, hazardous	1,330	490
<i>Tab Manufacturing</i>	Lead (recycle)	0	16,647
<i>Transformer Disposal Specialists, Inc.</i>	PCBs	0	23,459

Source: Rinchem 1998a

HWMF: Hazardous Waste Management Facility

kg: kilogram

NSSI: National Sources & Services, Inc.

PCB: polychlorinated biphenyl

RCRA: Resource Conservation and Recovery Act

SNL/NM: Sandia National Laboratories/New Mexico

^a Represents only material handled through the HWMF^b Includes recyclable waste

Table H.3–10. Hazardous Waste Management Facility (HWMF) 1997 Waste and Recycle Quantities Shipped

WASTE/MATERIAL TYPE	TOTAL SHIPPED (kg)
<i>Asbestos</i>	155,951
<i>ER Project</i>	338,635
<i>Explosives</i>	130
<i>Lead (Recyclable)</i>	16,647
<i>Non-RCRA</i>	69,321
<i>PCBs</i>	28,591
<i>RCRA</i>	55,852
<i>Recyclable (Other)</i>	7,879
<i>Subtitle D ^a</i>	4,728
<i>Used Oil (Recyclable)</i>	36,242
TOTAL	713,976

Source: Rinchem 1998a

ER: Environmental Restoration

kg: kilogram

PCB: polychlorinated biphenyl

RCRA: Resource Conservation and Recovery Act

^aSubtitle D refers to RCRA Subtitle D as defined in 40 CFR Parts 257 and 258.

Note: Recyclable materials are considered to have economic value and are not included as waste for calculations.

Table H.3–11. Hazardous Waste Management Facility Operations Storage Capacities

FACILITY	CAPACITY	
	(m ³)	(kg)
<i>Waste Packaging Building 959</i>	21.65	21,715
<i>Waste Storage Building 958</i>	226.95	227,587
<i>Modular Storage Buildings</i>	37.89	38,001
TOTAL	286.50	287,303

Source: SNL/NM 1998a

kg: kilograms

m³: cubic meters

H.3.4 Special Projects Wastes

H.3.4.1 Environmental Restoration Project

Overall projections indicate the ER Project, a special project beyond the scope of normal operations, will be the single largest waste generator at SNL/NM in 1998.

In 1997, SNL/NM shipped approximately 0.58 M kg of hazardous (RCRA and TSCA) waste for offsite disposal. The ER Project was responsible for 338,635 kg of that total. The ER Project will produce and dispose of various waste types, primarily contaminated soil and debris, by the conclusion of the project in 2004. The environmental consequences associated with the project are discussed separately in the ER Project Environmental Assessment (DOE 1996c). However, the ER Project waste volumes are included in this analysis and are listed in Table H.3–12.

H.3.4.2 SNL/NM Facility

A second special project beyond the scope of normal operations, to renovate and refurbish outdated metal, temporary office, and trailer structures, is currently planned for the next 10 years. The projections directly affect the quantity of TSCA hazardous waste requiring disposal. Under these projections, SNL/NM would continue to generate TSCA hazardous waste, primarily asbestos removed from older buildings and PCBs from old transformers, at the rate of approximately 122,000 kg per year. A total of 184,542 kg of TSCA waste, generated through special projects, was shipped offsite for disposal in 1997.

No projections are made for this program beyond the year 2007. The wastes generated under this special project are related indirectly to the decrease in gross square feet of facilities presented in Table H.3–13.

H.3.4.3 Legacy Waste Work-Off Project

Legacy waste is considered to be waste material currently in storage pending disposal. For the most part, legacy waste is either radioactive or classified. SNL/NM is in the process of disposing of this waste as treatment and disposal capacity becomes available. The projected time frame for removal of this waste is discussed in Appendix G.

H.3.5 Nonhazardous Waste

H.3.5.1 Solid Waste

Municipal solid waste is usually transported once a week from SNL/NM. In 1997, 51 shipments were made from SNL/NM Solid Waste Transfer Facility to the Rio Rancho Sanitary Landfill. For the SWEIS analysis, the bounding calculation assumed the disposal of solid waste would be located within 50 km. These volumes are not expected to vary significantly over the time frame of the SWEIS. Solid

**Table H.3–12. Analysis of Environmental Restoration
Project-Generated Waste Volumes**

YEAR	WASTE TYPE	VOLUME (m ³)	WEIGHT ^a (kg)
1996^b	<i>RCRA Hazardous</i>	274.7	314,981
	<i>LLW</i>	374.2	429,046
	<i>LLMW</i>	66.5	76,232
	<i>TSCA Hazardous</i>	3.8	4,384
	<i>Nonhazardous</i>	43.6	49,975
	Subtotal	762.8	874,626
1997^b	<i>RCRA Hazardous</i>	34.8	39,957
	<i>LLW</i>	255.3	292,727
	<i>LLMW</i>	99.6	114,240
	<i>TSCA Hazardous</i>	5.4	6,137
	<i>Nonhazardous</i>	74.9	85,921
	Subtotal	470	538,883
1998	<i>RCRA Hazardous</i>	20,066.1	23,007,630
	<i>LLW</i>	2,216.8	2,541,780
	<i>LLMW</i>	53.2	61,022
	<i>TSCA Hazardous</i>	901.5	1,033,686
	<i>Nonhazardous</i>	109.1	125,112
	Subtotal	23,346.8	26,769,230
1999	<i>RCRA Hazardous</i>	694.6	796,402
	<i>LLW</i>	15.5	17,762
	<i>LLMW</i>	1.8	2,017
	<i>TSCA Hazardous</i>	878.6	1,007,384
	<i>Nonhazardous</i>	38.2	43,837
	Subtotal	1,628.7	1,867,403
2000	<i>RCRA Hazardous</i>	1,529.3	1,753,497
	<i>LLW</i>	-	-
	<i>LLMW</i>	-	-
	<i>TSCA Hazardous</i>	-	-
	<i>Nonhazardous</i>	-	-
	Subtotal	1,529.3	1,753,497
TOTAL		27,737.5	31,803,638

Source: SNL/NM 1998m

LLMW: low-level mixed waste

LLW: low-level waste

RCRA: Resource Conservation and Recovery Act

TSCA: Toxic Substances Control Act

^aConversion based on 1997 average waste density of 1,146.6 kg/m³^bactual quantities

Table H.3–13. SNL/NM Facility Square Footage Changes

YEAR	NUMBER OF BUILDINGS	GROSS SQUARE FEET
<i>Current Levels</i>	674	5,020,014
<i>FY 1998 through 1999 Decreases</i>	-138	-179,204
<i>FY 2000 through 2002 Decreases</i>	-49	-108,937
<i>FY 2003 through 2007 Decreases</i>	-29	-84,132
<i>FY 1998 through 2007 Increases</i>	+7	+240,000
TOTALS THROUGH 2007	465	4,887,741

Source: SNL 1997a

FY: fiscal year

Note: Table does not include leased space.

waste projections are shown in Table H.3–14. Quantities of building debris generated from construction and demolition (C&D) activities are currently disposed of onsite at the KAFB Landfill and are shown in Table 5.3.10–3.

H.3.5.2 Wastewater

Wastewater is discussed in detail in Sections 4.4, 5.3.2, 5.4.2, and 5.5.2 of the SWEIS. Projections of wastewater volumes are shown in Table H.3–15.

H.3.6 Recyclable Materials

SNL/NM routinely recycles solid waste materials such as scrap metal, paper, cardboard, and plastics. SNL/NM also recycles hazardous materials such as lead, waste oil, solvents, and other chemicals whenever possible. Recyclable materials are considered to have economic value and are, therefore, not included as waste for calculations. See Section 4.12 for a detailed discussion.

Table H.3–14. Solid Waste Quantities from Existing Facilities and New Facilities (Operations)

SOLID WASTE	BASE YEAR ^a	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
<i>Site-Wide Municipal Solid Waste (m³)</i>	2,022	2,006	1,955	2,022	1,955
<i>Change From Base Year (%)</i>	0	-0.8	-3.3	0	-3.3

Sources: SNL/NM 1998a, c, y
m³: cubic meters

^a The base year varies depending on information provided in the *Facilities and Safety Information Document* (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.
Note: See Table 5.3.10–3 for construction and demolition wastes.

Table H.3–15. Analysis of Process Wastewater Generation from All Existing Facilities and New Facilities (Operations)

WASTEWATER	BASE YEAR ^a	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
		2003	2008		
<i>Existing Operations Wastewater (M gal)</i>	49	62	84	86	51
<i>New Operations Wastewater (M gal)</i>	0	4	4	5	3
TOTAL OPERATIONS WASTEWATER (M gal)	49	66	88	91	54
<i>Site-Wide Water Use (M gal)</i>	440	454	463	495	416
<i>Site-Wide Wastewater^b (M gal)</i>	280	290	304	322	268

Sources: SNL/NM 1997b, 1998a, c
M gal: million gallons

^a The base year varies depending on information provided in the *Facilities and Safety Information Document* (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.

^b Wastewater includes process water and sanitary water

H.4 SUMMARY

Table H.4–1 is a summary of total waste volumes for the waste categories addressed above, by base year, under each of the three alternatives. Percentage increases or decreases from base year are also shown.

Table H.4–1. Summary of Waste Volumes and Percent Increases/Decreases by Alternative for All Operations

SUMMARY OF ALL WASTES	UNITS	BASE YEAR ^a	NO ACTION ALTERNATIVE		EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
			5-YEAR	10-YEAR		
<i>Radioactive Waste</i>	m ³	98.9	174.9	176	289.4	106.4
<i>RCRA Hazardous Waste</i> ^b	kg	55,852	70,469	74,358	92,314	53,123
<i>Solid Waste</i>	m ³	2,022	2,006	1,955	2,022	1,955
<i>Process Wastewater</i>	M gallons	280	277	270	280	270
<i>Radioactive Waste</i>	% Change	0	76.9	78	192.7	7.6
<i>RCRA Hazardous Waste</i>	% Change	0	24.4	31.3	74.3	-8.8
<i>Solid Waste</i>	% Change	0	-0.8	-3.3	0	-3.3
<i>Process Wastewater</i>	% Change	0	-1.1	-3.6	0	-3.6

Sources: SNL/NM 1997b, 1998a, c, m, y;
D&D: decontamination and decommissioning
kg: kilograms
M: million
m³: cubic meters
RCRA: Resource Conservation and Recovery Act

SNL/NM: Sandia National Laboratories/New Mexico
TSCA: Toxic Substances Control Act

^a The base year varies depending on information provided in the *Facilities and Safety Information Document* (SNL/NM 1997b). Typically, the base year is 1996 or 1997, as appropriate.

^b SNL/NM operations are projected to generate approximately 122,000 kg of TSCA hazardous waste annually, primarily from D&D operations.

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